SECTION 111 - MEMBRANE ROOFING SYSTEM

1. GENERAL DESCRIPTION

The Contractor shall furnish and install a Sure-Seal EPDM membrane roofing system in strict accordance with the drawings and specifications for an Adhered System (Design "A") as approved by Carlisle Syntec Systems, a Division of Carlisle Corporation, to an existing built-up roof system at the Water Treatment Plant.

2. QUALITY ASSURANCE

The roofing system shall be installed by a roofing contractor approved by Carlisle Syntec Systems. Upon completion of the installation, an inspection shall be made by a representative of Carlisle Syntec Systems to ascertain that the roofing system has been installed accordingto Carlisle Syntec Systems published specifications and details. There shall be no deviation made from this specification without prior written approval by the manufacturer and the Engineer.

3. SUBMITTALS

The Contractor shall submit shop drawings for approval. Shop drawings shall also be approved and assigned a number by Carlisle Technical Services Section. Shop drawings shall include the outline of roof and roof size; location and type of all penetrations; perimeter and penetration details; special details, etc.

4. PRODUCT DELIVERY, STORAGE AND HANDLING

Deliver materials in original, unopened containers. Containers labeled with manufacturer's name, brand name, installation instructions and identification of various items. Store materials, except membrane, between 60°F and 80°F. If exposed to lower temperature, restore to proper temperature before using. Store materials, except membrane, in dry area and protect. Damaged materials shall be replaced at Contractors expense.

5. CAUTIONS & WARNINGS

Do not install EPDM membrane directly onto low melting point asphalt (ASTM D-312, Type I & II).

Do not allow waste products (petroleum, grease, oil, solvents, vegetable or mineral oil, animal fat) or direct steam venting to come in contact with Sure-Seal Roofing System.

Do not expose membrane and accessories to a constant temperature in excess of 180°F.

Cements and bonding adhesives contain petroleum distillates and are extremely flammable. Do not breathe vapors or use near fire.

Sure-Seal splice cleaner used in the splicing procedure is extremely flammable; do not use near fire or flame or in a confined or unventilated area. Dispense only from a UL listed or approved safety can.

Splicing and bonding surfaces shall be dry and clean.

Cold temperatures will not restrict installation of Sure-Seal Roofing System. Follow specified precautions for storage of materials and expose only enough cement and adhesive to be used within a four (4) hour period.

Roof surface shall be free of ponded water, ice, or snow to eliminate future condensation problems.

6. WARRANTY

A Carlisle Syntec Systems representative shall inspect the installation of the roofing system and upon approval a twenty (20) year warranty shall be issued. The warranty will be in effect upon notice of acceptable completion of the project. The warranty applies only to products purchased from Carlisle Syntec Systems.

7. MATERIALS

Components to be products of Carlisle Tire & Rubber Company or accepted by Carlisle Syntec Systems as compatible, complying with ASTM D 4637, Type I.

A. Membrane. The membrane shall be 0.060 inches thick, 10 feet x 50 feet or the largest sheet possible as determined by job condition, EPDM (Ethylene Propylene Diene Monomer) compounded elastomer conforming to the following minimum physical properties:

PROPERTY	TEST METHOD	SPECIFICATION
(Metric - S1 Units) Gauge	ASTM D412	± 10%
Color		Grey/Black
Specific Gravity	ASTM D297	1.18 ± .03
Tensile Strength	ASTM D412	1305 psi min.
Elongation	ASTM D412	350% min.
Tear Resistance, Die C	ASTM D624	175 lb./in. min.
*Ozone Resistance	ASTM D1149	No Cracks
	7 days/100 pphm/104°F/50%	Ext.
*Heat Aging (Accelerated)	ASTM D573	Ten. min. 1200 psi
	28 days/240°F	Elong. min. 225%
*Brittleness Temperature	ASTM D746	-75°F.
*Permeability, Water Vapor	ASTM E96 Proc. BW	2.0 perm-mils

*These are continuing tests involving considerable time and will not be included in material certifications.

B. Related Materials.

1. Flashing. Sure-Seal Flashing .060 inches thick, furnished by membrane manufacturer.

2. Bonding Adhesive. Compatible with materials to which the membrane is to be bonded, furnished by membrane manufacturer.

3. Splicing Cement. Furnished by membrane manufacturer.

4. Splice Cleaner. Furnished by membrane manufacturer.

5. Lap Sealant. Compatible with materials with which it is used, shall be trowel or gun consistency, furnished by membrane manufacturer.

6. Water Cut-off Mastic. Compatible with materials with which it is used, furnished by membrane manufacturer.

7. Molded Pipe Flashing. Compatible with materials with which it is used, furnished by membrane manufacturer.

8. Nite Seal. Compatible with materials with which it is used, furnished by membrane manufacturer.

9. Pourable Sealer. Compatible with materials with which it is used, furnished by membrane manufacturer.

10. Rubber Fastening Strips (RFS) and Universal Fasteners. Extruded fastening strips furnished by membrane manufacturer

8. SUBSTRATE INSPECTION

Contractor shall be responsible for providing proper substrate to receive the Sure-Seal Roofing System, and work shall not proceed until defects have been corrected.

9. SUBSTRATE PREPARATION

The existing aggregate roof surfacing shall be carefully cleaned by power brooming. Remove all high spots in the existing built up roof. Cut and repair all blisters, etc. prior to the hot steep asphalt application. All debris and waste aggregate shall be removed from the project site.

10. INSTALLATION.

A. Insulation Installation. The prepared dry surface of the existing roof deck shall be flooded with hot steep asphalt. The insulation shall be stepped firmly to ensure full surface contact without air pockets. The insulation boards shall be butted together with no joints greater than 1/4 inch.

B. Membrane.

1. Position Sure-Seal Roofing Membrane over approved substrate without stretching.

2. Allow membrane to relax approximately 30 minutes prior to bonding.

3. Fold sheet back so that one-half of the underside of sheet is exposed. Sheet fold shall be smooth, no wrinkles or buckles.

4. Apply bonding adhesive evenly with paint roller. Adhesive shall be applied to both sheet and substrate. One gallon of adhesive will cover approximately sixty (60) S.F. of finished surface. Allow adhesive to dry until tacky, but not string or stick to a dry finger touch.

5. Roll coated membrane into substrate adhesive, avoiding wrinkles.

6. Brush down bonded half of the sheet with push broom to achieve maximum contact.

7. Fold back the unbonded half of the sheet and repeat bonding procedure.

8. Apply adjoining sheets in same manner lapping edges a minimum of three (3) inches. Do not apply bonding adhesive to the splice area.

C. Splicing.

1. Fold top sheet back approximately twelve (12) inches. Clean both mating surfaces at splice area using clean rags and splice cleaner.

2. Apply splicing cement to both mating surfaces of a three (3) inch splice. Allow cement to dry until tacky but not string or stick to a dry finger touch.

3. Roll top sheet toward splice area until the cemented area is nearly touching cement on bottom sheet along entire length of splice. Allow top sheet to fall freely into place avoiding stretching and wrinkling.

4. Roll splice with a steel roller, using positive pressure, toward the outer edge of splice.

5. Solvent cleans the splice edge, extending at lease one (1) inch onto top and bottom membranes.

6. Apply bead of Lap Sealant completely covering the splice edge. Feather the Lap Sealant with a specially formed putty knife or trowel as supplied by manufacturer. Complete Lap Sealant application on all splices by the end of each working day.

D. Perimeter Membrane Securement.

1. Rubber Fastening Strips (RFS), if used at cant locations, shall be mechanically fastened through membrane, insulation, existing B.U.R. and into the concrete deck.

a. Top of mechanical fasteners shall be set flush with the top surface of the RFS. Space mechanical fasteners a maximum of twelve (12) inches on center starting one (1) inch from the end of RFS.

b. After mechanically fastening the RFS, it shall be sealed with a six (6) inch wide strip of Sure-Seal Flashing using cement and lap sealant on all edges.

2. Wood Nailer shall be installed as shown on the standard details. Anchor the wood nailer to the concrete deck to resist a force of seventy-five (75) pounds per lineal foot of wood nailer in any direction. The top of a wood nailer shall be flush with the top of the new fiberboard insulation.

3. Metal Termination Bars shall be 1/8" x 1" metal bars mechanically fastened at locations shown on the detailed drawings.

E. Flashing. Perimeter flashing and flashing around vents, etc., shall be one with Sure-Seal Flashing using the longest pieces practicable. All flashings and terminations shall be done in accordance with Carlisle's standard details.

1. Complete splice between flashing and main roof sheet before bonding flashing to vertical surface. Splice shall extend at least (3) inches beyond the fasteners which attach the membrane to the horizontal surface.

2. When using continuation of roofing membrane as flashing, bond membrane to the surface to be flashed. Then install Sure-Seal Flashing as required to form continuous membrane seal in each corner.

a. Apply bonding adhesives evenly, no globs or puddles, with a 9” plastic core paint roller.

b. Apply bonding adhesive to both flashing and surface to which it is being bonded at a rate covering approximately 60 sq. ft. of finished surface.

c. After the bonding adhesive has dried to the point where it does not string or stick to a dry finger, roll the flashing into the adhesive. Care must be taken to assure that the flashing does not bridge where there is any change of direction (e.g. - where the parapet meets the roof deck).

d. Nail installed flashing at top of flashing every 12" on center maximum under metal counter flashing or cap.

3. Flash all penetrants (pipes, conduits, etc.) passing through the membrane.

a. Flash pipe with molded pipe flashings where installation is possible.

b. Molded pipe flashings cannot be cut and patched.

c. Where molded pipe flashings cannot be installed, use field fabricated pipe seals.

d. In reroofing, remove existing pipe flashing.

4. Roof Drains.

a. In reroofing, remove existing lead flashing and cement in preparation for Water Cut-Off Mastic and membrane seal.

b. Taper insulation around drain to provide a smooth transition from roof surface to drain clamping ring.

c. Seal between membrane and drain base shall be Water Cut-Off Mastic as shown in Carlisle's standard details.

F. Daily Seal. Care should be exercised to ensure that the water does not flow beneath any completed sections of roof. Temporarily seal loose edge of membrane with Sure-Seal Nite Seal when weather is threatening.

1. Mix the two components thoroughly according to the instructions on the label.

2. On existing B.U.R., remove gravel. Surface shall be clean and dry.

3. Apply the Nite Seal at a rate of 100 lineal feet per gallon, (on smooth surface) (12) inches back from edge of sheet onto exposed substrate surface. If necessary, use a trowel to spread material in order to achieve complete seal. Onto existing built-up roof surface, this coverage will be reduced according to surface preparation.

4. After embedding membrane in Nite Seal, CHECK FOR CONTINUOUS CONTACT. Then weight the edge, providing continuous pressure over the ength of the cutoff. The recommended weight for the continuous pressure is a ten (10) foot length of 2-1/2" Sure-Seal Lay Flat Tubing filled with dry sand.

5. When work is resumed, pull sheet free before continuing installation.

G. Wood Construction. Wood nailers (1" x 6") and wood cants shall be installed as shown on the standard details. The locations of the nailers shall be as specified by Carlisle Syntec Systems. All wood shall be preservative treated lumber.

H. Metal Work. Metal Work (caps, sleeves, etc.) shall be installed as shown on the detailed drawings. The metal shall be formed from galvanized steel sheets (24 gage minimum) and shall be continuous at corners and angles. End joints shall be lapped.

Metal edge flashing (gravel guards) with clips shall be installed around the exterior perimeter edge as shown on the detailed drawings. The metal shall be formed from galvanized sheets (22 gage minimum). The metal shall be continuous at corners and angles. End joints shall be lapped.

Metal gutters and downspouts shall be provided at each location shown on the detailed drawings. See detailed drawings for size of gutters and downspouts.

All existing gutters, downspouts, and scruppers to be removed if shown on the plans or if required for proper installation of roofing materials.

I. Miscellaneous Work. The Contractor shall provide the necessary special flashings, etc. to achieve an effective water tight seal.

Precast concrete splash blocks shall be provided at each downspout location shown on the detailed drawings. Also provide a slip-sheet of cured EPDM membrane beneath the splash block for protection of the roof membrane.

11. ALTERNATE ROOFING SYSTEMS

The above specifications basically describe a membrane roofing system furnished by Carlisle Syntec Systems. Other membrane roofing systems may be used on this project if prior approval has been obtained from the Engineer. To receive consideration on any alternate membrane roofing system, full descriptive material must be submitted to the Engineer at least ten (10) days prior to date of receiving proposals by the Owner for evaluation purposes. Notice of the approval of any alternate membrane roofing system will be made only by addendum, duly issued and mailed or delivered to each party having a set of contract documents.